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S1854 S2316 S3025

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(54) Abstract Title
Material primarily for marine or sub-aqua use

(57) A composite laminate primarily for making up into wet or dry suits comprises a waterproof layer of a polychloroprene rubber such as neoprene and an outer abrasion resistant layer containing aromatic polyamide fibres. An inner layer of nylon or polyester fabric may be present. The layers may be adhered together. The abrasion resistant layer may comprise 25% Kevlar (RTM), 5% Lycra(RTM) and 70% polyamide. Other possible uses mentioned include motor-cycle clothing and panniers, vehicle roofs, booties and gloves for water-sports, fishermen's waders, rucksacks and holdalls.

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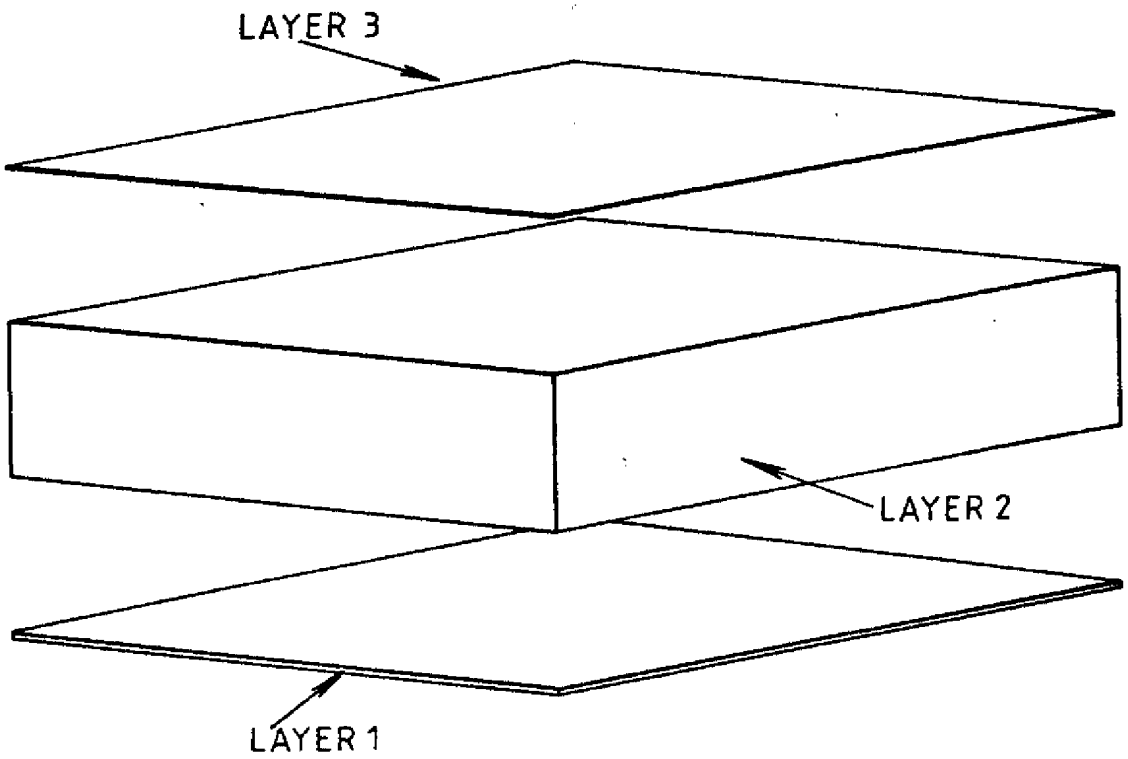
LAYER 3
LAYER 2
LAYER 1

TITLE:

Material primarily for marine garments

This invention relates to a material which is primarily intended for use in the manufacture of garments used in marine environments and more particularly for sub-aqua use.

Clothing worn for water sports and diving may comprise dry-suits, wet-suits, gloves and headgear and the materials used should provide water impermeability and protection as well as allowing freedom of movement. These requirements can be somewhat contradictory in practice.

An object of this invention is to provide a material suitable for the above mentioned purposes and which provides protection, impermeability and light weight with good freedom of movement.

According to this invention there is provided a material suitable for use in the manufacture of clothing primarily intended for marine use, said material comprising a polychloroprene rubber, for example Neoprene, bonded or laminated to a aromatic polyamide fibre or para-aramid based layer, for example including Kevlar, or the equivalent thereof.

In this invention reference is made to the material known under the Regsitered Trade Mark KEVLAR but an equivalent thereof having similar properties may be substituted.

A feature of this invention is the composition of the Kevlar based layer and in a preferred embodiment this layer comprises Kevlar incorporating and elastin fibre such as that known under the Registered

Trade Mark LYCRA.

When made up into garments with the Kevlar layer being external the material according to this invention provides enhanced protection and warmth for the hands and bodies of wearers engaged in water sports of various kinds and in addition durability is much improved.

According to this invention there is also provided a garment such as a dry-suit for marine use and fabricated at least in part from the material of this invention

Known materials comprising bonded laminates of neoprene and polyester or nylon have a very short life and in some environments this is measured in days.

A feature of this invention is the bonded lamination of the neoprene and Kevlar based layer forming the material from which the relevant article of clothing is made in contrast to a mere mechanical connection forming a reinforced area of a garment.

The bonded lamination may be effected during the production of the neoprene layer and is thus fully integrated therewith.

In an embodiment only a portion of a garment may be formed from the laminate but in most cases this will be a major part of the product being the most vulnerable areas.

In a preferred construction the neoprene rubber layer forms the base of the material and the Kevlar based outer layer is bonded with this with a further polyester or nylon layer bonded to form an inner layer.

One embodiment according to this invention is shown by way of an example only in the drawings illustrating schematically a section through a

portion of the material.

Referring to the drawings:

Layer 1.

Forms an internal lining layer of the material and may be a polyester or nylon having a 0.5 mm thickness. Both sides of the neoprene layer may be provided with this layer if necessary.

Layer 2.

Forms the middle layer of neoprene and may be 0.5 to 10 mm, more specifically 2 to 8 mm thick. This material may be that which is customarily used for water-wear.

Layer 3

Forms the external layer and may be about 1 mm thick. This material comprises KEVLAR or is based thereon. A typical material used for this layer is manufactured by Schoeller Textil AG, of Sevelen, Switzerland under the code 13316. This material comprises:

5.0% Elastin fibre (LYCRA)

25.0% Polyamide fibre (KEVLAR)

70.0% Polyamide Nylon

The composition of this material may vary. The feature of this invention is the use of the Kevlar component in the material.

The Kevlar based layer 3 and possibly also the internal layer 1 may be bonded to the neoprene by means of an adhesive of suitable compatibility. As an alternative method of lamination the Kevlar based layer 3 may be applied in a molten or semi-molten state and rolled under pressure to bond with the neoprene. In a further method the layers may

be connected by means of threads of Kevlar material being Kevlar filaments twisted together.

The laminated material disclosed proved to be effective for the manufacture of gloves and a diver's dry-suit. For the latter all outward facing external surfaces of the suit were manufactured from the laminate material.

To achieve the bonding of the component layers to form the laminate adhesive may be applied to one or both mating surfaces of the layers and the layers brought together and subject to heat and pressure in a press. The adhesive used and the cure times will be selected according the properties of the adhesive used.

For certain parts of a dry-suit, for example, the internal layer 1 may be omitted. This is particularly required for the cuff areas connecting with gloves for example where the internal surface adjacent the skin of a wearer has to be smooth neoprene which provides a good water seal. Thus this invention also contemplates a material comprising layers 2 and 3 only as least for some components of a garment.

The material of this invention may be used for making up into wet-suits and dry-suits for water sports, sub-aqua activities and caving; motor-cycle clothing and panniers; roofs for vehicles; booties and gloves for water-sports; fishermen's waders; rucksacks and holdalls and generally for articles which are to be water impervious and durable and in particular abrasive resistant.

The laminate comprising the Kevlar based layer and the neoprene layer may be bonded by applying an even coat of adhesive to both mating

surfaces or to one surface only and after drying for a short period the layers are brought together and subject to heat and pressure. A nitrile based adhesive such as EVOSTIK 5007/2 may be used which requires a drying period but little or no pressure or heat to achieve a bond. An adhesive such as ScotchGrip requires no drying time but does require heat and pressure to achieve a cure and bond. Both these methods have proved satisfactory in practice.

CLAIMS

1. A material suitable for use in the manufacture of clothing primarily intended for marine use, said material comprising a waterproof layer of a polychloroprene rubber, for example Neoprene, bonded or laminated to an abrasion resistant layer having a base of an aromatic polyamide fibre or para-aramid, for example a layer including Kevlar, or the equivalent thereof.

2. A material in accordance with Claim 1, wherein the abrasion resistant layer comprises Kevlar incorporating and elastin fibre such as Lycra.

3. A material according to Claim 1 or 2, wherein the abrasion resistant layer comprises 25% Kevlar, 5% Lycra and 70% Polyamide nylon.

4. A material according to any preceding Claim, wherein the waterproof neoprene rubber layer forms a base layer with the abrasion resistant layer bonded to one side thereof and a further layer of a polyester or nylon fabric bonded to the other side thereof.

5. A material according to any preceding Claim, wherein a layer of a polyester or nylon material is bonded to the waterproof layer and to which the abrasion resistant layer is thereafter bonded.

6. A material in accordance with any preceding claim wherein, the layers are bonded using an adhesive material comprising a contact adhesive applied to one or both relevant mating surfaces or a curable adhesive applied to one or both relevant mating surfaces after which the laminate is subject to heat and pressure to cure the adhesive.

7. A garment such as a dry-suit for marine use and fabricated at least in part from the material according to any preceding Claim.

8. A garment according to Claim 7, wherein the abrasion resistant layer is external and an internal fabric layer is bonded to the waterproof layer.

9. A garment according to Claim 8, wherein the internal layer is omitted from areas where a waterproof seal is required the waterproof layer being exposed in said areas.

10. A material or a garment according to any preceding Claim, wherein the waterproof layer of neoprene is between 0.5 and 10 mm, preferably between 2 and 8 mm, in thickness; the Kevlar based abrasion resistant layer is approximately 1 mm in thickness and the internal layer of polyamide or nylon is 0.5 mm in thickness.

11. A material substantially as herein described and exemplified.

12. A garment primarily for marine use constructed from a material as described herein and exemplified.

The Patent Office

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Claims searched: 1 to 12

Examiner: R.J.MIRAMS
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Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.6): A41D 31/00, 31/02. B32B 25/10. B63C 11/04. D06N 3/10.

Other: ONLINE: WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2025789A	(Verseidag) e.g. claim 11	at least 1
X	GB2011244A	(Leisurelite) e.g. page 1 lines 50 to 57	at least 1, 6 and 7
X	US4604759A	(Bowman) e.g. column 3 lines 11 to 21	at least 1 and 7
X	US4454611A	(Tschirch) e.g.figure 2 and column 2 line 64 to column 3 line 27	at least 1 and 7
X	US4255817A	(Heim) whole document	at least 1 and 7
X	CA1056553A	(Ellis) e.g. claim 12	at least 1 and 7
A	GB2242860A	(Middleton)	
A	US4276341A	(Tanaka)	

X Document indicating lack of novelty or inventive step
Y Document indicating lack of inventive step if combined with one or more other documents of same category.
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E Patent document published on or after, but with priority date earlier than, the filing date of this application.